



Colony of Seychelles.

IMP. BUREAU ENTOM.

Recd. 27 AUG 1915

Ans.

ANNUAL REPORT

ON

AGRICULTURE AND CROWN LANDS

FOR THE

YEAR 1914.

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1915.

AGRICULTURE

AND

CROWN LANDS

ANNUAL REPORT

1914.

EXPENDITURE, RECEIPTS, SALE OF PLANTS.

			Rs	c.
Sale of produce	...	...	1,548	99
Royalty on Guano	...	...	17,767	07
Export duty on Guano	...	...	18,607	00

Total Rs ... 37,922 66

Total Expenditure under Agriculture and Crown Lands ... Rs ... 12,776 65

Among the principal seeds and plants sold in 1914 the following may be mentioned :—

- Cymbopogon nardus (Ceylon citronella)
- Cymbopogon flexuosus (Cochin lemon grass)
- Cymbopogon citratus (Ceylon lemon grass)
- Albizzia moluccana
- Cassuarina equisetifolia
- Coffea robusta
- Coffea canephora
- Dendrocalamus gigantea (giant bamboo)
- Eleis guineensis (Palm oil)
- Ipomea Batatas (W. Indian Varieties)
- Saccharum officinarum (sugar cane seedlings from Mauritius)
- Mentha piperita (Peppermint)
- Mucuna atropurpurea (velvet beans)

Clove, cinnamon bark and leaves were also sold coming from the Crown Lands Niol and Capucin to the amount of Rs 233.41. Small cinnamon trees were trimmed for the sale of their leaves and care was taken that the top shoots should be left untouched to ensure their healthy growth. They suffered but little and 6 months after pruning there are no signs of their leaves having been gathered. Cinnamon trees are becoming scarce in the Colony and to ensure their being propagated by birds, which is done mostly by the common mynah (*Acridotheres tristis*), and the fruit pigeon care was also taken to prevent the large seed bearing trees from being touched. The smaller trees were trimmed from July to October, i.e., after the flowering and seed bearing season was over.

Among the economic plants introduced, the following are recorded :—

1. *Mentha piperita*. (Peppermint seeds from Italy). The seeds germinated well and the plants were easily propagated from cuttings. Both the white and black peppermints have been obtained from the seeds.

2. Soft kernel palm oil (*Eleis guineensis*). With much difficulty these interesting palms were successfully introduced from the Cameroons through the instrumentality of His Excellency the Governor of Southern Nigeria. The seeds did not germinate before September, i. e., 9 months after sowing, and some of them are still growing. About 100 seedlings have been obtained.

3. Cohune nut palm (*Attalea Cohune*) was introduced from Trinidad in June and 12 seedlings were obtained in December.

4. *Maximiliana caribæa* palms producing nuts which are used in Brazil for the curing of Para rubber by the smoking process.

5. The following fruit trees:—Peach and *Achras Sapota* from Mauritius, Sweet Sop (*Anona squamosa*) from Washington, *Nephellium mutabile* and *Lappaceum* from Java, *Garcinia Odoica* (Mangosteen) from Singapore, *Anona* sp. and papaw from Brasil. Brasil nut from Trinidad (*Bertholletia excelsa*).

6. A few timber trees came from the Philippines and Ceylon, *Albizia Ade*, *Intsia bijuga*, *Pterocarpus Achinodes*, *Pahudia rhomboides* and *Mesua ferrea*.

CONDITION OF THE GARDEN, STRIKING SPECIES ESTABLISHED.

Among the plants which have flowered or borne fruit for the first time, the following may be mentioned:—

1. *Porana volubilis* introduced from India. This creeper flowered for the first time in July and since then nearly every 2 months. Its sprays of white flowers are more compact than that of the *Porana paniculata* or liane de Mai which flowers so freely in Seychelles. The newly introduced plant is of less spreading habit of growth than its rival, the liane de Mai, which, when once established is so vigorous that it suffocates in a short time all the trees on which it grows.

2. *Sesbania grandiflora*. This small tree introduced from India flowered for the first time in August nor has it escaped the attention of the Indians who eat its beautiful flowers. The large number of seeds produced will allow its being tried as a prop for vanilla culture.

3. *Rubus Idoeus* var. This plant flowered and fruited regularly in Delanos at 1800 feet elevation. Cuttings made to propagate it were tried successfully at Niol at 600 feet elevation and even at Victoria where no doubt the abundant rains of this year enabled it to stand this hot climate.

4. *Bougainvillea lateritia*. This plant was propagated with difficulty from cuttings. It is now established. Blossoming for the first time this year, its flowers were much admired.

5. *Phyllanthus myrtifolius*. A hedge plant suitable for garden walls is an important addition to the great number of hedge plants already introduced.

6. *Malpighia* sp. (Barbados cherry) was also introduced successfully from Barbados.

7. *Guaiacum officinale*. This South American shrub producing the bark used for its medicinal properties deserves an important place in ornamental gardens. Introduced from Singapore it has grown rapidly during the last 2 years flowering abundantly. Its blue flowers attracted particular attention. There are few plants growing in the Colony which have flowers of the same colour.

8. *Congea tomentosa*. A plant very remarkable for its pinkish blue flowers. Its rival the *Petrea volubilis*. The branches of the *Congea* have leaves of 2 different forms, hairy and glabrous. Sometimes the leaves are hairy in the lower part of the branch and become glabrous near the extremities. The last leaves nearest the flowers are much reduced in size and of about the same colour as the flowers themselves, thus forming a handsome spray most delicately shaded. I have noticed that cuttings provided with hairy leaves strike root easily and produce more vigorous plants than the other glabrous ones.

9. *Heeria Macrostachys*. This Mexican shrub introduced from Ceylon in 1911, flowered this year. Its pink flowers are delicately coloured. The present very rainy weather is very favourable to its growth. It does not do well in low lands during a spell of dry weather.

10. The *Allamanda grandiflora* does very well in rainy weather and flowers abundantly all the year round. It may not be quite as successful in years of drought. The flowers last better in vases than those of other varieties.

11. *Quisqualis* sp. A creeper introduced from India with flowers quite different from those of the very successful *Q. Indica* or *Badamier sauvage*. The red flowers of the newly introduced plant are more similar to those of the *Combretum Coccineum*, (*Poivre*) to which it is closely allied.

12. The *Eranthemums*, *E. Albomarginatum*, *E. Nigrescens*, *E. Reticulatum*, *E. Eldorado*, introduced from India in 1911, have become at once very popular. They are already preferred to crotons and make very handsome hedges. They are practically free from those scale insects which generally attack all other plants of the same family (*Acanthaceæ*).

FISHERIES.

The Export from Outlying Islands for 1914 amounted to :

Article	Quantity	Declared value
Guano	tons 18607	Rs 558,210 ...
Tortoise shell	kilogs 613.380	23,073 94
Calipee	„ 9064	20,094 ...
Fish oil	hectolitres 6.37	318 ...
Turtle oil	„ 5.94	118 80
Turtle shell	kilogs 415	285 ...
Salt fish	„ 8845	1882 ...
Trepang	„ 400	200 ...
Shark fins	„ 1353	798 ...

Owing to the war no whale oil was exported last year. A new company which started whale fishing in 1913 has erected at St Anne a large up to date factory which began to work in October. The whales captured are nearly all sperm-whales, cachalot (*Physeter macrocephalus*). One however a right whale (*Baleine franche*, *Balaena Australis*) was caught. It appears that there is some reason to think that the *Sejhval* (*Balenoptera borealis*) migrates yearly to the seas round the Seychelles and that some will be harpooned.

The fishing grounds are off Denis Island and Bird Island (60 to 80 miles from Mahé). The steam whale boats cannot go much farther out as the oil has to be extracted when the whales are still fresh. It is calculated that whales may be found during some months in the neighbourhood of Chagos and Maldive Archipelagos which are not situated at a longer distance from Mahé than are some of the outlying islands of the Seychelles group (Aldabra).

In July and October, the spermwhales were found in considerable numbers, observations made in December would indicate the approach of the breeding season as occurring towards the end of the year. The principal food of the sperm-whale is the cuttlefish or octopus which seems to be very common round about Seychelles.

Modern weapons are used for whaling. Harpoons loaded with explosive shells are fired from guns. This is generally mortal so that seldom more than 150 fathoms of rope are required to hold the whales when they start off sounding. This rope is only 1½ inches in diameter near the harpoon to make it as slight as possible, but after the first 50 feet, ropes of double that size are employed.

The whales thus captured are towed ashore and hauled up on an inclined slip by means of powerful winches. A portion of the whale about 4 feet square is cut away behind the head to which hooks are fixed to drag it off with the blubber by means of the winch and this is continued right down to the tail. These pieces of the blubber are then placed in a chopping machine and then boiled in tanks provided with steam pipes. The water is evaporated and drained off and the oil is boiled a second time leaving a residue as thin as paper. The head is cut into and twisted off by the winch. It is then put on a beam over a tank. An incision is made and the spermaceti which is contained in sacs like bladders drained off. This most valuable oil is pumped from the tank into another one where it is boiled. The remains are then dragged by the winch, and cut or sawn into convenient sizes, which are likewise boiled down in a steam boiler. By means of special taps placed on the side of the boiler at determined intervals, water, other residues, and the oil itself are drained off. While the bones remain unchanged the fleshy portions are reduced into pulp within 3 hours time. The doors of the boiler are then opened, the bigger pieces of bones are dug out and broken into small pieces. Steam is again employed and the reduced matter is then lifted by an elevator into a patent drier, a cylinder provided

with 3 furnaces. In each of these furnaces there is a shaft driven by pullies to which blades are fixed which work into the mass. The reduced pulp which passes through the first furnace by the screw motion of the blades is dropped into the second furnace. From there it passes into the third furnace, the drying taking place at 60 lbs steam pressure within 20 minutes.

This matter thus gradually shredded and dessicated passes afterwards into a desintegrator in which it is pulverised and then lifted by an elevator into cylindrical revolving sieves for sifting out the coarse stuff which is passed a second time into the desintegrator.

During the drying process, centrifugal fans take the fumes from the furnaces and blow them into the fire to avoid the smell as much as possible.

A whale 30 feet long yields 13 to 16 barrels of oil (barrels of 42 gallons), but a foot in the length of a whale makes a lot of difference in the bulk of the body and a whale 55 feet long yields as much as 90 to 100 barrels. The average length of the 60 whales caught in 4 months up to date was 35 feet and the yield amounted to 20 barrels each. The proportion of spermaceti and other oils for a whale 44 feet long was the following :—

Spermaceti oil	...	34 barrels
Blubber oil	...	40 „
Meat oil	...	14 „

Total 88 „

No ambergris was found but remains of beaks of the octopus were discovered in the intestines of the whales tending to confirm the old theory that this valuable substance originates from concretions formed in the body of the animals round undigested fragments of cuttlefish.

The principal market for whale oil is Marseilles where it is turned into all sorts of edible fats or used in soap manufactures. Its present price is as high as £34 a ton.

In the course of the year a letter was received by His Excellency the Governor from Professor Gudger of the United States with reference to the possibility of studying and capturing shark whales (*Chagrin*) *Rhinodon typicus*, in Seychelles waters. Fishermen report that this great shark whales (10 to 50 feet long) is found all the year round in Mahé mostly on the shoals between Silhouette and N. W. Bay and at some distance between Mamelles and Ste Anne. They appear to become more numerous when big numbers of carangue balo (*caranx gymnotethoides*) are seen in the neighbourhood.

METEOROLOGICAL OBSERVATIONS.

The total rainfall for 1914 is by far the highest on record for the last 10 years. It amounted to 121.58 inches, being higher by 36 inches than that of 1913. Rain fell very heavily from January to June and from September to December, leaving only 2 months, July and August during which there was less rain. Still the number of rainy days were 16 in July and 10 in August. Light rains occurred often although the total rainfall for these two months did not much exceed 2 inches. When rains fall abundantly during 6 months and stops for a short time only to begin again 2 months after with the same violence, the period of vegetative activity continues all the year round. Though this is beneficial to coconuts, Hevea rubber, &c., which are coming from wet equatorial countries, where abundant rains occur, the same cannot be said of vanilla which is of mexican origin and indigenous to drier countries. It is however beneficial in Seychelles to have a long period of rainy weather excepting for vanilla which is one of the plants to the crop of which continual rains are detrimental. Other plants including bananas, coconuts, rubber, cassava, sweet potatoes, yams, eddoes (arouilles), breadfruit, jacktrees &c., benefit considerably from heavy rains not only because the soil is softened and rendered more accessible to the roots, but also because the rains destroy the numerous parasites that infest the leaves and flowers of the above mentioned trees during the dry weather.

Meteorological Observations.

Temperature			Hygrometer			Rainfall		Rainfall from June to June.			
Daily average per mensem	Maximum	Minimum	Wet Bulb	Dry Bulb	Humidity	Total monthly	No. of rainy dys	Months	1912-13	1913-14	1914-15
January	84.9	74.0	76.0	83.1	98	18.77	16	June	7.13	8.24	3.50
February	89.6	70.2	79.6	83.0	92	6.61	12	July	4.53	7.72	1.11
March	91.2	73.5	80.8	85.0	92	19.26	17	August	0.76	3.80	1.24
April	90.1	73.0	76.0	85.0	87	12.01	19	September	5.08	0.71	12.25
May	95.4	74.8	77.1	90.2	89	9.52	16	October	4.37	2.10	13.70
June	85.7	71.5	75.5	82.3	94	3.50	16	November	4.28	9.79	10.93
July	86.2	75.3	75.7	85.5	78	1.11	16	December	13.51	20.26	12.68
August	84.8	72.5	71.7	82.0	79	1.24	10	January	3.89	18.77	18.54
September	84.8	72.9	78.2	82.2	87	12.25	22	February	8.11	6.61	
October	85.6	72.2	75.5	83.2	80	13.70	17	March	9.43	19.26	
November	89.1	73.4	78.0	86.3	79	10.93	19	April	8.12	12.01	
December	90.6	82.0	81.3	84.0	93	12.68	12	May	2.77	9.52	
	88.1	73.7	77.1	84.3		121.58	192		71.98	118.77	

THE COCONUT INDUSTRIES.

THE FOLLOWING NUMBER OF NUTS WERE GATHERED IN 1914 AS COMPARED WITH THE CROPS FOR 1911 TO 1913.

	1911	1912	1913	1914
Nuts exported in nature ...	445,795	182,227	103,350	173,102
„ converted into oil ...	209,448	698,400	534,325	795,190
„ „ coprah ...	18,131,015	19,153,393	20,946,485	25,805,781
„ „ soap ...	408,969	839,104	452,046	346,612
„ consumed locally ...	4,000,000	4,000,000	4,000,000	4,000,000
TOTALS ...	23,195,227	24,873,124	26,036,206	31,120,685

THE COCONUT INDUSTRIES.

The annexed tabulated return shows the steady increase in the coconut crop for the last 4 years. As anticipated in my report for last year the rise is proceeding by leaps and bounds. The crop for the year under review amounts to 11,00,000 nuts being greater by 5,000,000 nuts than the crop for the preceding year. This result bears testimony to the greater attention which is paid by planters to their coconut plantations. The crop will continue to increase for a long time as during the last 5 years nearly 100,000 more coconut trees were set out and these trees will be bearing in 5 years. The present increase is solely due to the plantations having been cleaned regularly and freed of the fungus and beetle diseases to some extent. The leading planters are also taking the trouble to manure with compost, seaweeds, cowdung &c., and the results already obtained will gradually induce them to use guano, green manures and chemical fertilizers. A good deal of subsoiling by hand has also been done but unfortunately the use of explosives for the breaking of the hardpan a few inches underground has not been attempted owing to the difficulty of getting explosives at a cheap price. The practice of digging trenches in which all the refuse is thrown in is more and more largely adopted on level land. I hope it will gradually extend to hill-sides pending the use of explosives, otherwise the rocky nature of the ground allows a very small depth of soil being utilised by the roots of the plant on these slopes. Trenches dug at right angles to the slopes and though small but fairly level, while preventing erosion, would gradually allow the roots to penetrate deeper. The accumulation of plant food in the subsoil gradually loosened by trenches would also go far to counteract the rapid deterioration of coconut palms in times of drought. The small depth of proper soil obtainable at present forces the trees to extend their roots near the surface at considerable lengths, sometimes exceeding 50 feet, and a loss of energy is the result while the accumulation of proper soil and moisture at the foot of the trees would tend to satisfy their requirements more easily and benefit their bearing power.

In 1905 the crop was only 18 million nuts and one can say that in 15 years the crop has been doubled. A gain of 5 million nuts over last year represents Rs 200,000, and this result, as already stated, has been obtained without increasing the acreage under cultivation.

Owing to the war the average prices paid for 1000 coconuts in Mahé during 1914 fell from Rs 49 to Rs 41, the minimum price reaching Rs 25. A loss of Rs 8 per 1000 nuts on 25,707,542 nuts converted into coprah during the year represents a loss of over Rs 200,000 borne by the Colony as far as the coprah industry alone is concerned. The prices are fortunately rapidly increasing and at the time of writing (February 1915) they have already become normal. The market of Marseilles to which nearly all Seychelles firms ship their coprah is not very steady; the fluctuation reaching as much as Rs 120 per ton in ordinary times. The effort now being made in England to import coprah in larger quantities will undoubtedly create a wider opening for the coprah produced in Seychelles and regularize the market prices. On the Continent it appears that there is some fluctuation in the demand for the edible oil obtained from coprah and that the arrivals of coprah from the Far East are not regular. This double influence prevents the Marseilles firms from fixing their prices in advance for a long period and the result is that there is some risk at present in purchasing coconuts at more than Rs 40 a thousand in Seychelles for the manufacture of coprah.

The question of selection of varieties of coconuts is not lost sight of by a few planters. This selection depends however on so many factors that little progress in the right direction has been made. One of these factors unobserved hitherto is the number of female flowers produced by the different varieties which is very variable. Mr Petch of Ceylon has called in December 1913 the attention of planters to this subject. The flowerings do not take place regularly in Seychelles and this accounts for the irregularity of the crop which generally reaches a maximum in July and drops to a minimum in

February. The number of female flowers per bunch does not vary on the same tree, but during the months of minimum crop there are much less inflorescences produced by the tree, notwithstanding the weather conditions, and many of these contain no female flower at all. It is from trees producing the greatest number of female flowers per bunch and per annum that seednuts should be selected. Admitting that the number of ripe nuts per tree is a sufficient guide for selection, there is however another factor, i. e., the fall of immature nuts which has to be taken into consideration and which seems also to be of a character proper to some kinds. Many trees which drop their nuts before maturity seem to recover from this defect during the months of maximum production and should not be necessarily discarded in the work of selection. From a few observations made when the trees are young and in their third year of blossoming, the natural tendency of the trees can be well determined and there is no need to wait till they are old and produce their full crop of ripe nuts, to carry on the work of selection. For trees which flower after their 7th year of growth the question of gaining time in the work of selection is to be seriously considered.

THE VANILLA INDUSTRY.

The quantity of vanilla exported in 1914 amounted to 10 tons. This is the 7th crop in succession which is much below the average. The last good crop was obtained as far back as 1907 (about 70 tons). This is a heavy blow to the vanilla planters of the Colony especially the small moitié system planters who have given up planting vanilla in many localities and replaced it by the culture of banana which is less profitable but which gives more regular crops. The owners of large estates on the contrary have taken up vanilla cultivation on a larger scale since the advent in 1911 of the wet seasons and nearly made good all their previous plantations which had been destroyed by 7 years of drought. I estimate the number of vanilla vines set out since 1911 at about 500,000 and many of these plantations look so promising that a very large crop is anticipated at an early date.

In 1914 the weather had been rainy and very favourable for the growth of vanilla until June but the month of July was too wet (16 rainy days having been recorded) and the rainfall was again very high in September. August was the only month during which a small rainfall favoured the flowering but the spell of dry weather was too short and the rainfall preceding and succeeding it was too heavy to allow the vines to flower under normal conditions. This remark shows how difficult it is for vanilla to flower in wet countries like Seychelles and on what a small factor the vanilla crop depends. There is no doubt that localities where the dry weather lasts longer, are more favourable to the flowering of the orchid. But in rainy countries vegetation is decidedly more vigorous and a very large high crop is obtained under favourable conditions. Vanilla suffers especially when no rain takes place for over 5 months.

The following series of experimental plots on the manuring of vanilla were set out during the year :—

1. Control plot.
2. Mulching with leguminous weeds and twigs.
3. Mulching with ordinary grass.
4. Mulching with ordinary grass plus lime.
5. Mulching with ordinary grass plus Phosphate (Seychelles rock guano).
6. Mulching with ordinary grass plus complete fertilizer (Biogine Truffaut).
7. Mulching with ordinary grass plus complete soluble fertilizer (Truffaut).
8. Mulching with ordinary grass plus Potash in the form of Potassium Sulphate.
9. Mulching with ordinary grass plus Potash in the form of Potassium Chloride.
10. Mulching with ordinary grass plus nitrogen in the form of Ammonium Nitrate.
11. Mulching with ordinary grass plus nitrogen in the form of Nitrate of Soda.

12. Mulching with leguminous weeds and twigs plus complete fertilizer (Biogine Truffaut).

13. Control plot.

In these experiments all costly manures have been excluded even stable manure which, after all, it is difficult to obtain on a large scale except at prohibitive prices. Concentrated complete and soluble manures are alone used especially the complete fertilizers of the firm Truffaut of fixed composition, which are already known to most planters. All chemical manures cannot be employed in vanilla culture, those full of organic matters may by fermentation cause the decay of the roots or from their bulk be considered too expensive for transport reasons. Three other sets of experimental plots are being prepared and as soon as the war is over it is hoped that more money will be devoted to them. Until now no extra expenditure has been incurred.

This is not so easy to care for as most planters imagine. A series of experiments were outlined and started by this Department 12 years ago. A few promising results were obtained and recorded. Some of these were reproduced in the Bulletin of the Imperial Institute for 1909 and in a standard book on Spices by H. N. Ridley, F. R. S. But from want of funds the experiments were stopped and at various times I was asked to resume them. As the vanilla vines under experiment have to be planted in homogenous soil properly walled in and even in cemented basins one can imagine that they must be attended to continually and that the experiments when once started should on no account be altered or discontinued.

The necessity of growing vines of equal strength, in walled in plots where the soil is rendered homogenous, precludes the experimental plots being too large and for this reason a scheme had to be adopted which provides for their duplication and even triplication without which no scientific experiment is possible. Furthermore the manuring experiments must preferably be made in cemented basins, as stated the first time they were started in 1903. Vanilla culture is not possible without shade, shelter and live props of some sort. Those employed for that purpose, when once the manure is spread very soon produce an abnormally high number of rootlets which find their way to the fertilizers. The poor orchid is thus deprived of a great part of the manure upon which the experiments are based, and it also suffers from the effect of the network of rootlets hindering its growth.

A separate experiment has also been made in a bed measuring 22 feet long in which 22 vines have been set out at the same time. In this plot the props used were cuttings of *Gliricidia maculata* and in the other plots the usual Pignon d'Inde (*Jatropha curcas*) props. The experiment was tried to determine the influence of the newly introduced shrub as a vanilla prop. The rapid growth of this leguminous shrub, its resistance to diseases and to adverse conditions of soil and climate and the ease with which the cuttings strike roots in all classes of soil render it an ideal one for vanilla culture. So far it has been successful, its abundant foliage being at least 10 times more vigorous than that of the Pigeon d'Inde without being either too heavy. After 2 months growth it has been possible to set the vanilla vines on the props and at the time of writing, i.e., 8 months after the cuttings were planted out, it becomes necessary to prune the shrub and thus obtain with the prunings an excellent mulch on the spot for the orchid. It remains to be seen to what extent its rapid growth will dry up the soil in absorbing too much moisture in time of drought. However there is no indication so far that the vanilla vines are suffering in the least from deficiency of moisture although the plot is fully exposed to the sun. In comparing this shrub with all the others used as vanilla props in the low country one is struck at once by the possibility of making in a short time a vanilla plantation in fully exposed situations without having to plant any trees to shade the vines beforehand. I do not think any other shrub used hitherto can benefit a shade loving orchid in the same way, especially when one considers that it is a leguminous plant capable of fixing atmospheric nitrogen and improving the soil itself.

The following props were uprooted after nine months growth to examine the root system of each and consider their suitability as props for vanilla.

Bois chandelle (*Draccena angustifolia*) from cuttings. 7 feet high with 2 small branches giving insufficient shade, 4 roots at right angles to each other 7 feet long but provided with very few rootlets.

2. Pignon d'Inde (*Jatropha curcas*) from cuttings. 7½ feet high with 3 branches, 3 big roots sharply tapering with fine extremities and 5 very small roots.

3. *Gliricidia maculata* from cuttings. 12 feet high with 12 branches, tap root 3 feet long together with 14 roots placed like the tubers of a cassava plant, the longest measuring 5 feet and the shortest 1 foot. This powerful root system accounts for the rapidity of growth of this plant and one may hope that the deep roots deprived of a network of rootlets will not interfere too much with the roots of vanilla.

4. Cashew nut (*Anacardium occidentale*) from seeds. 5 feet high with 3 branches, 1 slender tap root and a few rootlets. The root system is weak as compared with that of the other plants.

Under the action of persistent rains the vanilla disease which is always found attacking a few scattered vines on all estates assumed this year a virulent form on several estates causing whole plantations to be destroyed in a few months. This disease which was recorded in Seychelles and in many other parts of the world in or about 1887 has been described at Kew in 1892 by Massee to whom specimens from Seychelles were on several occasions forwarded. It is due to a fungus of the *Peronospora* family and it is the first time since 1901 that it has caused wholesale destruction on several plantations. The vines apparently healthy suddenly take a whitish yellow colour, the leaves become flappy and the stems grooved like old vines in the last stages of their existence. The roots and the tendrils gradually die off from their extremities and the whole plant looks as if the supply of water to the leaves had been suddenly cut off. Galbraith, a successful vanilla planter in the Colony in the nineties published in 1898 under the auspices of the United States Department of Agriculture, a remarkable pamphlet on the culture of vanilla in Seychelles. This disease is mentioned several times as being of great as well as of sudden destructiveness and difficult to control, but no description of it is given. Since that time vanilla culture in Seychelles has progressed satisfactorily and planters although fully aware of the presence of the disease on a few vines here and there, take no notice of it. This is sufficient proof that general outbreaks of the disease are of seldom occurrence and that the malady is far from being generally very destructive. I do not think that it has become more destructive than formerly.

The fungus, according to the description by Massee, lives on the leaves and does all the mischief, but it does not reproduce itself there. It takes another form on dying and dead leaves and this new form remains quiescent for a long time doing no mischief whatever. Eventually a third form is produced on the dead leaves, probably under some climatic influence such as persistent wet weather, and it is this third or *calospora* form which reproduces the first or *Hainsea* form which infects living tissues. On the estates which I visited there was no difficulty in spotting the *Hainsea* form on the flappy leaves but it is not on all diseased plants. The necessity for the fungus of acquiring several stages in transmitting the disease is evidently shown by the slow progress of the malady under normal conditions. I have even seen vines which looked on the verge of destruction recover when transplanted on a new plot free from diseased germs. For this reason experiments have been started to follow and study the transmission of the disease to healthy vines and to suggest remedies. Pending a more complete knowledge of the ways of transmission, it would be wise to destroy diseased vanilla vines on all estates as also the dead leaves and especially to avoid taking cuttings from old diseased plantations for restocking estates. Other noxious causes have been indicated such as the shade of *Hevea rubber* &c., but this tree has been used as shade for 5 or 6 years already and it is only this year that it has been mentioned as hurtful. New specimens of diseased vanilla has been forwarded to Mr Petch of Ceylon with a view to ascertaining whether besides the ancient fungus no new organism is the adjuvant cause of the disease at present prevailing.

ESSENTIAL OILS AND MINOR INDUSTRIES.

CINNAMON.

Although attempts are being made to distill cinnamon bark in Seychelles, the greater part of it mostly used as incense, is for exportation. The quantity exported is however declining but reaches as much as 600 tons valued at Rs 44,649 for 1914, a decrease of 165 tons compared with last year. It is worth recording that this Ceylon tree, introduced by Poivre in the middle of the 18th century, was mistaken for the Chinese cinnamon (*C. Cassia*) and no notice of it was taken until 1908 although it had been identified by this Department as far back as 1902. From 1908 to this date more than four million Rupees worth of cinnamon bark has been exported. It is one of the predominating trees here growing as well on the sea shore and alongside rivers as on the highest summits. Under the action of the late heavy rainfall, some plants which had been nearly stripped of the whole of their bark by planters, are now producing new shoots from the base of the stem. The exportation of the bark will be inconsiderable pending the growth of the new shoots. It is to be regretted that most of the trees are barked while standing instead of being carefully felled and allowed to grow again from suckers. The tree is also propagated naturally by mynahs and pigeons which are very fond of its oily seeds. No plant is less likely to disappear from the jungle than the cinnamon tree in spite of its being the prey of scale insects (*Lecanium tessellatum*). Useful for their leaves which on distillation produce an oil heavier than water, the smaller trees as stated last year are simply trimmed for their leaves every 18 months. This is a much more economical way of working cinnamon trees in Seychelles and one likely to produce beneficial results of a more permanent character. The quantity of cinnamon leaf oil exported amounted to 8406 litres worth Rs 33,749 or double the quantity produced last year. Two more small distilleries were erected during the year under review, one at Bel Air and the other at Bel Ombre. Other essential oils exported were clove oil, lemon grass, and vetiver oils, but in much smaller quantities.

CITRATE OF LIME.

The quantity of citrate of lime manufactured at Silhouette amounted to 800 kilogs. It is obtained mostly from Bigarades (*Citrus limonellus*), but this small industry is carried on with up to date machinery. According to the Manager of Silhouette Island 1000 kilogs of bigarades yield 26 kilogs of citrate and 350 kilogs of lime yield 12 kilogs 500 grammes. As 61 bigarades and 22 limes weigh one kilo, it follows that 1000 limes yield less than 2 kilogs of citrate. In 1905 when I first recommended the production of citrate of lime in the Colony I obtained 3 kilogs per 1000 limes and the average weight of a lime was 55 grammes. The lime trees since then have been attacked by scale insects principally the *Lecanium viride* and the *Aspidiotus ficus* to which the small size of the fruits and their inferior yield is attributed. At high elevations scale insects are held in check by fungus parasites. For this reason a planter decided to start the cultivation of bigarades in Mahé at about 1000 feet elevation for the ultimate production of citrate of lime which is a paying industry and one not likely to suffer from overproduction.

BANANA.

The shortage in vanilla crops since 1907 and the giving up of the coconut oil industry for the more profitable making of coprah induced small planters to take up banana planting on a larger scale than formerly. The moitié system planters care very little for vanilla plantation at present owing to the uncertainty of the crops and as they can no longer depend on the byproduct (poonac) formerly obtained at a cheap price from coconut oil mills. They have adopted banana planting in order to feed cheaply their cattle and poultry and obtain a more regular produce which they can dispose of at remunerative prices.

I described last year the following varieties of bananas and plantains existing in the Colony and the article was reproduced in Kew Bulletin No. 6 of 1913.

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|---------------------------|---|-------------------------------------|
| 1. Malgache | } | Congo type. |
| 2. St Jacques | | |
| 3. Simeroe | | |
| 4. Gabou | | —Musa Cavendishii. |
| 5. Rouge | } | The latter derived from the former. |
| 6. Monsieur | | |
| 7. Noire | } | Growing at high elevations. |
| 8. Blanche | | |
| 9. Quatre-vingt or galega | | |
| 10. Duperrel | | |
| 11. Barbare | | |
| 12. Mignonne | | |
| 13. Tahiti | | |
| 14. Figue or gingeli | | |
| 15. Carré | | |
| 16. Graine. | | |

In November 1914 the gros Michel banana introduced from Fiji flowered for the first time and 2 varieties of fig bananas imported from Ceylon gave excellent results. These 3 varieties should be added to the list published in the Kew Bulletin.

The political prisoners from Africa and all the population in general use the bananas to a great extent as an article of food. Small quantities are also exported by the Messageries steamers to Aden and Marseilles. About 1000 bunches monthly are thus exported. This kind belongs to the Malayan type known locally as banane Mille. It is one of the most prolific banana grown in the Colony. Clumps 20 years old are found in many localities, for they are immune to the beetle disease (*Sphenophorus striatus*) which accounts for their exceptionally long period of growth. This species is far from being the best known in the Colony, but when gathered long before being ripe they will keep a long time without splitting or dropping from their stalks in transit. They have a peculiarly sour taste which is not disliked by the importers but their keeping qualities are the governing factors which account for the large sale of such an inferior type of banana. As much as 36 to 50 cents of a rupee is offered per bunch on board the homeward bound Messageries steamers.

The Ashanti political prisoners pay as much as 60 cents to a rupee and a half per bunch for the plantains of the Congo type known locally as Bananes Malgaches and St Jacques. These varieties are very susceptible to the beetle disease and unless planted in virgin soils must be replanted from suckers nearly every year. One of these varieties, viz., the St Jacques produces a bunch in a very short time (7 months) and for this reason it is planted on a great scale in soils sufficiently adaptable to its requirements.

RUBBER.

Para rubber may be classified at present as being a minor product of small importance. Only Rs 2360 worth of rubber was exported during the year. The tapping of the trees has been discontinued on most estates seeing its fall in the market price. Tapping will be resumed if the price goes up to 3 shillings, the present price of 2 shillings leaving no margin of profit. The Hevea plantations of this Colony are of healthy appearance and the trees free from parasites contrast with the other kinds covered with insects. There is hardly any other tree so well adapted to the soil and climate of this Colony. Had planters as advised by this Department, taken up Para Rubber planting in 1902 instead of delaying it until 1907, 1908 and 1909, they would have less reason to deplore the present state of things which tells so heavily on some of them. Fortunately there is only one small estate in the Colony depending on this crop, all the others depending on the coconut and vanilla produce at the same time.

CROWN LANDS.

The following plants were set out in the new forest at Niol:—

<i>Heritiera littoralis</i> (Bois de table)	1087
<i>Chrysobolanus icaco</i> (Coco plum)	1322
<i>Casuarina equisetifolia</i> (Cedar)	374
<i>Tecoma leucoxyton</i> (Calice du Pape)	1031
<i>Nephellium lappaceum</i> (Rambutan)	22
<i>Spondias dulcis</i> of improved type	136
<i>Dilenia indica</i>	91
<i>Parkia roxburghii</i>	320
<i>Stevensonia grandifolia</i>	125
<i>Verschaffeltia splendida</i>	37
Mauritius mangoes	108
<i>Eleis guiniensis</i>	45
<i>Glinicidia maculata</i>	597
Robusta coffee	715
<i>Hymenea verrucosa</i> (Gum copal)	425
Oranges (Seychelles)	43
<i>Terminalia chebula</i>	39
<i>Cola nitida</i> var. <i>rubra</i>	209
<i>Calophyllum inophyllum</i> (Takamaka)	116
Ceylon coconuts	19
Peach (<i>Persica vulgaris</i>)	9

The plantation in the new forest will be slowly extended for some time to come. Only empty spaces will be replanted and newly introduced specimens of exceptional importance required for seeding or planting will be set out. The labour force which consists of 5 men and 1 apprentice is just sufficient to maintain the existing plantations in order and take care as far as possible of 2000 acres of forest land. Some difficulty was experienced in reafforesting the open patches of ground formerly occupied by cassava plantations. The process of repeatedly burning the land and piling up mounds on which cassava is grown by small planters went far to render sterile part of the estates which were acquired by Government in 1910. As the barren areas were those which it was important to reforest at first without delay, much time and trouble were taken to plant successfully a certain number of hardy trees either indigenous or got from elsewhere.

These mounds of earth invariably made for cassava planting on sloping ground in this Colony, are the principal cause of the erosion of the land, as heavy downpours of rain bring down all such loosened earth to the bottom of the valleys and to the sea. This land gradually becomes impoverished and finally contains traces only of the necessary food elements. Such as it is, it is soon invaded by bracken fern (*Gleichenia dichotoma*) which spreads very quickly and prevents the seeds of forest trees from germinating and growing with the result that mountain forest zones are turned into dry savannah districts which lack a necessary supply of water. If it is not difficult to destroy these ferns and prevent their regrowth, unfortunately a dense mass of rootstocks, sometimes 3 or 4 feet deep severely handicap the holing and planting of this worn out soil. There are many other plots requiring to be reforested but they can only be gradually taken in hand by the small number of labourers available. In the parts already planted with trees these rootstocks apparently reappear after heavy rainfalls and the work of uprooting them must begin again.

A proof of the rapidity with which these noxious ferns invade the land to the almost complete exclusion of other plants was had this year when Government decided to acquire Morne Blanc estate. The estate less than 6 years ago was in good order without any trace of this fern visible in the vanilla plantation. After only 6 years of neglectful cultivation this fern, which started invading only at first a few square yards, now occupies the whole of the estate with the exception of a few plots certainly much smaller than the occupied areas. It will continue to cover the estate in question which is so sparsely wooded in the lower parts so favourable are the conditions for its growth.

INSECT NOTES.

A plentiful rainfall has been detrimental to ants (*Technomyrmex albipes*) and to scale insects, the principal injurious insects devastating the plantations all over the archipelago. Rains disturb ants from their nests and drown a large number of mature insects destroying at the same time the immature forms (larvæ and nymphs). Scale insects in wet weather are destroyed much more than during dry weather by fungus parasites.

It was hoped last year that a natural enemy of the small black ant could be introduced but expert advice obtained from the Director Imperial Bureau of Entomology showed that the natural enemy in question (*Eciton* ants) which are close allies of the well known driver ants of Africa, are extremely predaceous and pugnacious in their habits, so that it is quite probable that, if they were successfully established, they would prove to be even a more serious pest than the species it is desired to control.

Unfortunately in a hilly and precipitous country like Seychelles, covered everywhere with boulders more or less cracked in all directions where the ants congregate, it is difficult to adopt the measures which have been recommended elsewhere. Poisonous solutions are of little use and difficult to place within the reach of the ants. They act as repellents and not as poisons. Ditches filled with running water to limit the spread of the pest cannot be arranged.

A third method recommended by the United States Entomologists, viz., the use of trap boxes is, pending the discovery of a harmless natural parasite, the best method to be used in Seychelles, besides the systematic destruction of the nests by spraying them with soda resin solutions.

The banana borer (*Sphenophorus striatus*) is gaining ground every year and as banana cultivation is extending these parasites become more and more firmly established. All bananas are now attacked, varieties like banana Mille, Galega, Mignonne, Carré, Monsieur, Rouge, Noire, Blanche, being immune while St Jacques, Malgache, Gingeli, &c., are damaged to such an extent that suckers of these latter varieties have almost to be replanted every year.

Fortunately in the review of Applied Entomology for August 1914 mention is made of a beetle discovered in Java which preys upon the banana borer. It will not be difficult to introduce this friendly insect when the war is over, as it has already been introduced successfully from Java to Fiji.

From the latter Colony we obtained, as already stated last year, a consignment of Gros Michel banana suckers but these plants were infested with another banana weevil (*Sphenophorus sordidus*). Great care has been taken to remove all larvæ of the beetle before setting the suckers out and all the plants, except one, were uprooted after six months in order to ascertain if none of the insects had escaped destruction. This Gros Michel banana introduced from Fiji seems to suffer from a fungus parasite which discolours the tissue of the pseudostems and causes the leaves to hang down in a characteristic manner. Although apparently the same disease is found in the Colony principally on banane gingeli it was thought advisable to destroy all the Fiji plants attacked. It is worth while ascertaining by experiments if the fungoid parasite predisposes banana plants to an attack by the weavils as most of the varieties which are attacked by the fungus become a prey to the coleopter.

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